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10/728,806	12/08/2003	Kia Silverbrook	MTB03US	8905

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EXAMINER	
HSIEH, SHIH WEN	

ART UNIT	PAPER NUMBER
2861	

DATE MAILED: 01/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/728,806	SILVERBROOK, KIA
	Examiner	Art Unit
	Shih-wen Hsieh	2861

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12-16-04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 1, 3, 10, 20 and 29 are objected to because of the following informalities:

In regard to:

Claim 1:

Line 6, please change "the ejection" into "an ejection" to correct a minor lack of antecedent basis problem.

Claims 3 and 20:

Please add a "." at the end of this claim to indicate the termination of this claim. Appropriate correction is required.

Claims 10 and 29:

Line 2, please change "the area density" into "an area density" to correct a minor lack of antecedent basis problem.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 8 and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The recitation of: "wherein each of the nozzles defines an ejection aperture positioned less than 50 microns from the ejection aperture" is unclear. Please refer to fig. 1. In fig. 1, nozzle is indicated as numeral "3", and ejection aperture is indicated as numeral "5". Generally, in ink jet printer, nozzle and ejection aperture mean the same thing. So in this claim the recitation is to propose: the ejection aperture being defined by the nozzle is positioned less than 50 microns **from itself** (the ejection aperture). This does not sound right, if Examiner analyzes this claim right. Examiner suggests a recitation of: wherein each of the nozzles defines an ejection aperture positioned less than 50 microns **from the nozzles** be more appropriate. Please advice. There is no rejection other than this rejection to those claims in this office action.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., In re Berg, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422

F.2d 438, 164 USPQ 619 (CCPA 1970); and In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1-7, 9-26 and 28-54 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, 4, 6-20 and 22-47 of U.S. Patent No. 6,692,108 B1 ('108). Although the conflicting claims are not identical, they are not patentably distinct from each other because both cases deal with an ink jet print head with a certain driving energy. Below is a table of comparison between claims to indicate their obviousness:

10/728,806	**6,692,108 B1**
1. An ink jet printhead comprising: a plurality of nozzles, at least one heater element corresponding to each of the nozzles respectively, the heater element configured for thermal contact with a bubble forming liquid; such that, heating the heater element to a temperature above the boiling point of the bubble forming liquid forms a gas bubble that causes the ejection of a drop of an ejectable liquid through the nozzle corresponding to that heater element; wherein, the heater element requires less than 8 volts and a current of less than 60 milliamps for less than 1.5 microseconds, in order to form the	**1.** An ink jet printhead comprising: a plurality of nozzles; and at least one respective heater element corresponding to each nozzle, wherein each heater element is arranged to be in thermal contact with a bubble forming liquid, each heater element is configured to heat at least part of the bubble forming liquid to a temperature above its boiling point to form a gas bubble therein, thereby to cause the ejection of a drop of an ejectable liquid through the nozzle corresponding to that heater element, and each heater element is configured such that an actuation energy of less than 180

gas bubble that causes the ejection of the drop of ejectable liquid. **2**. The printhead of claim 1 wherein the heater element requires less than 5 volts and a current of less than 20 milliamps for less than 1.5 micro-seconds, in order to form the gas bubble that causes the ejection of the drop of ejectable liquid. **3**. The printhead of claim 1 wherein the heater element requires less than 3.5 volts and a current of less than 20 milliamps for less than 1.5 microseconds, in order to form the gas bubble that causes the ejection of the drop of ejectable liquid. **4**. The printhead of claim 1 wherein the heater element requires less than 3 volts and a current of less than 17 milliamps for less than 1.5 microseconds, in order to form the gas bubble that causes the ejection of the drop of ejectable liquid.	nanojoules (nJ) is required to be applied to that heater element to heat that heater element sufficiently to form a bubble in the bubble forming liquid thereby to cause the ejection of a drop of the ejectable liquid through a nozzle.
5. The printhead of claim 1 wherein the bubble forming liquid and the ejectable liquid are of a common body of liquid.	**3**. The printhead of claim 1 wherein the bubble forming liquid and the ejectable liquid are of a common body of liquid.
6. the printhead of claim 1 being configured to print on a page and to be a page-widthprinthead.	**4**. The printhead of claim 1 being configured to print on a page and to be a page-width printhead.
7. The printhead of claim 1 wherein each heater element is in the form of a cantileverbeam.	**6**. The printhead of claim 1 wherein each heater element is in the form of a suspended beam, arranged for being suspended over at least a portion of the bubble forming liquid so as to be in thermal contact therewith.
9. The printhead of claim 1 configured to receive a supply of the ejectable liquid at anambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of a said drop is less than the energy required to heat a volume of said ejectable liquid	**7**. The printhead of claim 1 configured to receive a supply of the ejectable liquid at an ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of a said drop is less than the energy required to heat a volume of said ejectable liquid

equal to the volume of the said drop, from a temperature equal to said ambient temperature to said boiling point.	equal to the volume of the said drop, from a temperature equal to said ambient temperature to said boiling point.
10. The printhead of claim 1 comprising a substrate having a substrate surface, whereinthe area density of the nozzles relative to the substrate surface exceeds 10,000 nozzles per square cm of substrate surface.	**8**. The printhead of claim 1 comprising a substrate having a substrate surface, wherein each nozzle has a nozzle aperture opening through the substrate surface, and wherein the area density of the nozzles relative to the substrate surface exceeds 10,000 nozzles per square cm of substrate surface.
11. The printhead of claim 1 wherein each heater element has two opposite sides and is configured such that a said gas bubble formed by that heater element is formed at both of said sides of that heater element.	**9**. The printhead of claim 1 wherein each heater element has two opposite sides and is configured such that a said gas bubble formed by that heater element is formed at both of said sides of that heater element.
12. The printhead of claim 1 wherein the bubble which each element is configured to form is collapsible and has a point of collapse, and wherein each heater element is configured such that the point of collapse of a bubble formed thereby is spaced from that heater element.	**10**. The printhead of claim 1 wherein the gas bubble which each heater element is configured to form is collapsible and has a point of collapse, and wherein each heater is configured such that the point of collapse of a bubble formed thereby is spaced from that heater element.
13. The printhead of claim 1 comprising a structure that is formed by chemical vapor deposition (CVD), the nozzles being incorporated on the structure.	**11**. The printhead of claim 1 comprising a structure that is formed by chemical vapor deposition (CVD), the nozzles being incorporated on the structure.
14. The printhead of claim 1 comprising a structure which is less than 10 microns thick, the nozzles being incorporated on the structure.	**12**. The printhead of claim 1 comprising a structure being less than 10 microns thick, the nozzles being incorporated on the structure.
15. The printhead of claim 1 comprising a plurality of nozzle chambers each corresponding to a respective nozzle, and a plurality of said heater elements being disposed within each chamber, the heater elements within each chamber being formed on different respective layers to one another.	**13**. The printhead of claim 1 comprising a plurality of nozzle chambers, each corresponding to a respective nozzle, and a plurality of said heater elements being disposed within each chamber, the heater elements within each chamber being formed on different respective layers to one another.
16. The printhead of claim 1 wherein each heater element is formed of solid	**14**. The printhead of claim 1 wherein each heater element is formed of solid

materialmore than 90% of which, by atomic proportion, is constituted by at least one periodicelement having an atomic number below 50.	material more than 90% of which, by atomic proportion, is constituted by at least one periodic element having an atomic number below 50.
17. The printhead of claim 1 which each heater element includes solid material and is configured for a mass of less than 10 nanograms of the solid material of that heater element to be heated to a temperature above said boiling point thereby to heat said part of the bubble forming liquid to a temperature above said boiling point to cause the ejection of a said drop.	**15.** The printhead of claim 1 wherein each heater element includes solid material and is configured for a mass of less than 10 nanograms of the solid material of that heater element to be heated to a temperature above said boiling point to cause the ejection of a said drop.
18. The printhead of claim 1 wherein each heater element is substantially covered by a conformal protective coating, the coating of each heater element having been applied substantially to all sides of the heater element simultaneously such that the coating isseamless.	**16.** The printhead of claim 1 wherein each heater element is substantially covered by a conformal protective coating, the coating of each heater element having been applied substantially to all sides of the heater element simultaneously such that the coating is seamless.
19. A printer system which incorporates a printhead, the printhead comprising: a plurality of nozzles, at least one heater element corresponding to each of the nozzles respectively, the heater element configured for thermal contact with a bubble forming liquid; such that, heating the heater element to a temperature above the boiling point of the bubble forming liquid forms a gas bubble that causes the ejection of a drop of an ejectable liquid through the nozzle corresponding to that heater element; wherein, the heater element requires less than 8 volts and a current of less than 60 milliamps for less than 1.5 microseconds, in order to form the gas bubble that causes the ejection of the drop of ejectable liquid. **20.** The system of claim 19 wherein the heater element requires less than 5 volts and a current of less than 20	**17.** A printer system incorporating a printhead, the printhead comprising: a plurality of nozzles; and at least one respective heater element corresponding to each nozzle, wherein each heater element is arranged to be in thermal contact with a bubble forming liquid, each heater element is configured to heat at least part of the bubble forming liquid to a temperature above its boiling point to form a gas bubble therein, thereby to cause the ejection of a drop of an ejectable liquid through the nozzle corresponding to that heater element, and each heater element is configured such that an actuation energy of less than 180 nanojoules (nJ) is required to be applied to that heater element to heat that heater element sufficiently to form a bubble in the bubble forming liquid thereby to cause the ejection of a

milliamps for less than 1.5 micro-seconds, in order to form the gas bubble that causes the ejection of the drop of ejectable liquid. **21**. The system of claim 19 wherein the heater element requires less than 3.5 volts and a current of less than 20 milliamps for less than 1.5 microseconds, in order to form the gas bubble that causes the ejection of the drop of ejectable liquid. **22**. The system of claim 19 wherein the heater element requires less than 3 volts and a current of less than 17 milliamps for less than 1.5 microseconds, in order to form the gas bubble that causes the ejection of the drop of ejectable liquid.	drop of the ejectable liquid through a nozzle.
23. The system of claim 19 being configured to support the bubble forming liquid in thermal contact with each said heater element, and to support the ejectable liquid adjacent each nozzle.	**18**. The system of claim 17 being configured to support the bubble forming liquid in thermal contact with each said heater element, and to support the ejectable liquid adjacent each nozzle.
24. The system of claim 19 wherein the bubble forming liquid and the ejectable liquid are of a common body of liquid.	**19**. The system of claim 17 wherein the bubble forming liquid and the ejectable liquid are of a common body of liquid.
25. The system of claim 19 being configured to print on a page and to be a page-width printhead.	**20**. The system of claim 17 being configured to print on a page and to be a page-width printhead.
26. The system of claim 19 wherein each heater element is in the form of a cantilever beam.	**22**. The system of claim 17 wherein each heater element is in the form of a suspended beam, arranged for being suspended over at least a portion of the bubble forming liquid so as to be in thermal contact therewith.
28. The system of claim 19, wherein the printhead is configured to receive a supply of the ejectable liquid at an ambient temperature, and wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of a said drop is less than the	**23**. The system of claim 17, wherein the printhead is configured to receive a supply of the ejectable liquid at an ambient temperature, and wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of a said drop is less than the

energy required to heat a volume of said ejectable liquid equal to the volume of the said drop, from a temperature equal to said ambient temperature to said boiling point.	energy required to heat a volume of said ejectable liquid equal to the volume of the said drop, from a temperature equal to said ambient temperature to said boiling point.
29. The system of claim 19 comprising a substrate having a substrate surface, wherein the area density of the nozzles relative to the substrate surface exceeds 10,000 nozzles per square cm of substrate surface.	**24**. The system of claim 17 comprising a substrate having a substrate surface, wherein each nozzle has a nozzle aperture opening through the substrate surface, and wherein the area density of the nozzles relative to the substrate surface exceeds 10,000 nozzles per square cm of substrate surface.
30. The system of claim 19 wherein each heater element has two opposite sides and is configured such that a said gas bubble formed by that heater element is formed at both of said sides of that heater element.	**25**. The system of claim 17 wherein each heater element has two opposite sides and is configured such that a said gas bubble formed by that heater element is formed at both of said sides of that heater element.
31. The system of claim 19 wherein the bubble which each element is configured to form is collapsible and has a point of collapse, and wherein each heater element is configured such that the point of collapse of a bubble formed thereby is spaced from that heater element.	**26**. The system of claim 17 wherein the gas bubble which each heater element is configured to form is collapsible and has a point of collapse, and wherein each heater is configured such that the point of collapse of a bubble formed thereby is spaced from that heater element.
32. The system of claim 19 comprising a structure that is formed by chemical vapor deposition (CVD), the nozzles being incorporated on the structure.	**27**. The system of claim 17 comprising a structure that is formed by chemical vapor deposition (CVD), the nozzles being incorporated on the structure.
33. The system of claim 19 comprising a structure which is less than 10 microns thick, the nozzles being incorporated on the structure.	**28**. The system of claim 17 comprising a structure being less than 10 microns thick, the nozzles being incorporated on the structure.
34. The system of claim 19 comprising a plurality of nozzle chambers each corresponding to a respective nozzle, and a plurality of said heater elements being disposed within each chamber, the heater elements within each chamber being formed on different respective layers to one another.	**29**. The system of claim 17 comprising a plurality of nozzle chambers, each corresponding to a respective nozzle, and a plurality of said heater elements being disposed within each chamber, the heater elements within each chamber being formed on different respective layers to one another.
35. The system of claim 19 wherein	**30**. The system of claim 17 wherein

each heater element is formed of solid material more than 90% of which, by atomic proportion, is constituted by at least one periodic element having an atomic number below 50.	each heater element is formed of solid material more than 90% of which, by atomic proportion, is constituted by at least one periodic element having an atomic number below 50.
36. The system of claim 19 wherein each heater element includes solid material and is configured for a mass of less than 10 nanograms of the solid material of that heater element to be heated to a temperature above said boiling point thereby to heat said part of the bubble forming liquid to a temperature above said boiling point to cause the ejection of a said drop.	**31**. The system of claim 17 wherein each heater element includes solid material and is configured for a mass of less than 10 nanograms of the solid material of that heater element to be heated to a temperature above said boiling point to cause the ejection of a said drop.
37. The system of claim 19 wherein each heater element is substantially covered by a conformal protective coating, the coating of each heater element having been applied substantially to all sides of the heater element simultaneously such that the coating is seamless.	**32**. The system of claim 17 wherein each heater element is substantially covered by a conformal protective coating, the coating of each heater element having been applied substantially to all sides of the heater element simultaneously such that the coating is seamless.

For saving of paper and time, discussions to the obviousness between these two cases are only directed to claims 1-18, since the recitations in claims 19-37 are similar to those in claims 1-18, and claims 38-54 are corresponding method claims (these claims are not tabulated in the table above), and the method steps in these method claims (claims 38-54) are deemed to be made obvious by the functions of the structure in the combination discussed for the apparatus claims. Below are the discussions:

In regard to:

Claim 1:

Subject matters such as nozzles, heater element, bubble forming liquid, etc. are the same for both cases.

The difference between the instant application and patent ('108) is:

the heating energy in the instant application is expressed in volts, ampere, and a time duration for the applied energy pulse, while patent ('108) is expressed in energy, its unit is nanojoules.

It is known in the Engineering field that, power (unit in watt) equals joules per second, in formula form:

Watts=joule/sec.

Also known in the Engineering field that the product of voltage (unit in volts) and current (unit in amperes) is the power (unit in watts). Therefore, the product of the power (in watts) and the timing period (in seconds) is the energy (in joule).

The above discussion is to indicate all the data (volts, amperes, seconds) given in the instant application are equivalent to the energy, which is used in patent ('108). Or, in short, they are the same. The only different is the magnitudes of the products of the volts, amperes and the time duration may not be the same as the magnitudes of the energy values in patent ('108). However, they are still the energy required to heat up the heater element, initiating phase change, forming bubble and shooting out of the nozzle as an ink droplet.

Claim 7:

Heater element is being specified as a cantilever beam. While such heater element in patent ('108) is being specified as a suspended beam. It is known in the Engineering field that a cantilever beam is a suspended beam. Or, such kind of beam is only supported at its one end only.

All other claims between these two cases in the table above are the same, and can be seen from the table above and are self-explanatory, and discussions are omitted for those claims.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shih-wen Hsieh whose telephone number is 571-272-2256. The examiner can normally be reached on 7:30AM -5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, S D. Meier can be reached on 571-272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). **SHIH-WEN HSIEH**
PRIMARY EXAMINER

Shih-wen Hsieh
Primary Examiner
Art Unit 2861

SWH
Jan 5, 2006